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(54) POLYVINYL ALCOHOL BASED POLYMER FILM AND POLARIZING FILM

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a polyvinyl alcohol based polymer film useful as the raw material for producing polarizing films having a reduced number of defects, and a polarizing film prepared by using the same.

SOLUTION: The polyvinyl alcohol based polymer film has a dissolved amount of the polyvinyl alcohol based polymer, when 100 cm² polyvinyl alcohol based polymer is left to stand in 1 liter water of 50°C for 4 hours, of 1-100 ppm. The polarizing film is prepared by using this film.

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CLAIMS

[Claim(s)]

[Claim 1] The polyvinyl alcohol system polymer film whose elution volume of the polyvinyl alcohol system polymer when leaving the polyvinyl alcohol system polymer film of 10cm angle in underwater [1l. / 50-degree C] for 4 hours is 1 to 100 ppm.

[Claim 2] The polyvinyl alcohol system polymer film according to claim 1 which is an object for polarization films.

[Claim 3] The polarization film produced using the polyvinyl alcohol system polymer film for polarization films according to claim 2.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] It is related with a polyvinyl alcohol system polymer film this invention has little number of defects, and useful as a manufacture raw material of a polarization film, and the polarization film produced using this.

[0002]

[Description of the Prior Art] The polarizing plate which has transparency and shield mechanism of light is the fundamental component of a liquid crystal display (LCD) in the liquid crystal which has the switching function of light. In recent years, large areas, such as a measuring machine machine outside a laptop computer, a word processor, a liquid crystal color projector, the navigation system for mount, a liquid crystal television, a personal phone, and indoor, are asked for few polarizing plates of a fault with high and polarizability also for Field of application of this LCD breadth and conventionally more than elegance from small devices, such as a calculator at the time in early stages of development, and a wrist watch.

[0003] a polarizing plate -- general -- a polyvinyl alcohol system polymer film (a following and polyvinyl alcohol system polymer -- "PVA" --) writing a polyvinyl alcohol system polymer film as a "PVA film" -- it is -- whether uniaxial stretching is carried out and it dyes After dyeing and carrying out uniaxial stretching, the boron compound performed fixed processing (fixed processing with dyeing). Or also when uniaxial stretching and fixed processing are coincidence, it has composition which stuck protective coats, such as a cellulose-triacetate (TAC) film, and an acetic acid, a butanoic acid cellulose (CAB) film, on a certain polarization film.

[0004]

[Problem(s) to be Solved by the Invention] By the way, when extending a PVA film, and it is a dyeing process and fixed down stream processing in a boron compound when extending by dry type, and extending with wet, in addition to it, a part of PVA in a PVA film may dissolve also at the swelling process and extension process before extension. Since dissolved PVA deposits within a tub, it adheres to a PVA film or a polarization film, or deposits on a PVA film and a polarization film and serves as a fault, it reduces the yield of a polarization film. Furthermore, PVA [having dissolved without depositing] requires costs for waste water treatment, and poses a problem.

[0005] Then, the purpose of this invention is to offer the polarization film produced using the PVA film useful as a manufacture raw material of few polarization films of the number of defects, and this PVA film.

[0006]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the PVA film of this invention is setting the elution volume of PVA when leaving the PVA film of 10cm angle in underwater [1l. / 50-degree C] for 4 hours to 1 to 100 ppm.

[0007] Since the PVA film of this invention has the small elution volume of PVA in each process (processes, such as dyeing, fixed processing, swelling, and extension) when producing a polarization

film, few polarization films of the number of defects are obtained with high yield by using this PVA film. Moreover, waste water treatment also becomes easy.

[0008]

[Embodiment of the Invention] Hereafter, this invention is explained to a detail. PVA used by this invention is manufactured by saponifying the polyvinyl ester obtained by carrying out the polymerization of the vinyl ester. This PVA Moreover, unsaturated carboxylic acid or its derivative, a partial saturation sulfonic acid, or its derivative, The denaturation PVA which carried out the graft copolymerization of the alpha olefin of carbon numbers 2-30 etc. at a rate below 15 mol %, Vinyl ester, unsaturated carboxylic acid or its derivative, a partial saturation sulfonic acid, or its derivative, The denaturation PVA manufactured by saponifying the denaturation polyvinyl ester which copolymerized the alpha olefin of carbon numbers 2-30 etc. at a rate below 15 mol %, The so-called polyvinyl-acetal resin which constructed [Denaturation / PVA / un-denaturalizing or] the bridge in some hydroxyl groups by aldehydes, such as formalin, a butyraldehyde, and the Benz aldehyde, can be mentioned.

[0009] As the aforementioned vinyl ester, vinyl acetate, formic-acid vinyl, propionic-acid vinyl, butanoic acid vinyl, vinyl pivalate, BASA tick acid vinyl, lauric-acid vinyl, stearic acid vinyl, benzoic-acid vinyl, etc. can be mentioned, and two or more sorts of such mixture etc. can be mentioned.

[0010] On the other hand, copolymerization of the comonomer used for Denaturation PVA is carried out mainly for the purpose of the denaturation of PVA, and with the above-mentioned vinyl ester, if copolymerizable, it will be used in the range which does not spoil the meaning of this invention. As such a comonomer, for example, ethylene, a propylene, 1-butene, alpha olefin [, such as isobutene,]; -- acrylic-acid and its salt; -- a methyl acrylate -- An ethyl acrylate, acrylic-acid n-propyl, acrylic-acid i-propyl, Acrylic-acid n-butyl, acrylic-acid i-butyl, acrylic-acid t-butyl, To acrylic-acid 2-ethyl, acrylic ester; methacrylic acids, such as KISHIRU, acrylic-acid dodecyl, and acrylic-acid octadecyl, and the salt; methyl methacrylate of those, Ethyl methacrylate, methacrylic-acid n-propyl, methacrylic-acid i-propyl, N-butyl methacrylate, methacrylic-acid i-butyl, t-butyl methacrylate, To methacrylic-acid 2-ethyl, methacrylic ester; acrylamides, such as KISHIRU, methacrylic-acid dodecyl, and methacrylic-acid octadecyl, N-methylacrylamide, N-ethyl acrylamide, N,N-dimethylacrylamide, Diacetone acrylamide, an acrylamide propane sulfonic acid, and its salt, Acrylamide derivatives, such as acrylamide propyl dimethylamine and its salt, N-methylol acrylamide, and its derivative; Methacrylamide, N-methyl methacrylamide, N-ethyl methacrylamide, a methacrylamide propane sulfonic acid, and its salt, Methacrylamide derivative; N-vinyl formamides, such as methacrylamide propyl dimethylamine and its salt, N-methylolmethacrylamide, and its derivative, N-vinyl amides, such as N-vinyl acetamide and N-vinyl pyrrolidone; The methyl vinyl ether, Ethyl vinyl ether, n-propyl vinyl ether, i-propyl vinyl ether, n-butyl vinyl ether, i-butyl vinyl ether, t-butyl vinyl ether, Vinyl ether, such as dodecyl vinyl ether and stearyl vinyl ether; Acrylonitrile, Nitril, such as a methacrylonitrile; A vinyl chloride, a vinylidene chloride, Halogenation vinyl, such as vinyl fluoride and vinylidene fluoride; An acetic-acid allyl compound, allyl compound [, such as an allyl chloride,]; -- a maleic acid and its salt, or ester; -- an itaconic acid and its salt, or ester; -- vinylsilyl compound [, such as vinyltrimetoxysilane]; -- isopropenyl acetate etc. can be mentioned. Also in these, an alpha olefin is desirable and especially ethylene is desirable.

[0011] As for the amount of denaturation of Denaturation PVA, it is desirable that it is less than [15 mol %].

[0012] More than 97 mol % of the saponification degree of PVA is desirable from the point of an elution volume and endurance, more than its 98 mol % is more desirable, more than its 99 mol % is still more desirable, and more than its 99.5 mol % is especially the most desirable.

[0013] Said saponification degree shows the rate of a unit of actually saponifying per vinyl alcohol, in the unit in which it is changed by saponification per vinyl alcohol and deals. In addition, the saponification degree of PVA measured by the approach given in JIS.

[0014] 1000 or more are desirable from the point of reducing the elution volume of PVA, and the point of the reinforcement of a PVA film, from the point of polarizability, as for the polymerization degree of PVA, 1500 or more are more desirable, 2000 or more are still more desirable, and 2500 especially or

more are the most desirable. As for the upper limit of the polymerization degree of PVA, 8000 or less are desirable, and 6000 or less are more desirable.

[0015] In addition, said polymerization degree of PVA is JIS. K It is measured according to 6726. That is, after re-saponifying PVA and refining it, it asks from the limiting viscosity measured by underwater [30-degree C].

[0016] PVA -- the following PVA solution for film production, and water -- it is important to remove beforehand PVA which washes with water or warm water in the state of the chip before the process which adjusts PVA, and is easy to be eluted. Organic solvents and plasticizers, such as an acetic acid, and a methanol, a glycerol, a surfactant, etc. may be included in the water or warm water to wash in the range which does not spoil the purpose of this invention.

[0017] The temperature of the water used for washing or warm water has desirable 90 degrees C or less above 10 degrees C, is more desirable above 20 degrees C, is still more desirable above 25 degrees C, and is the most desirable above especially 30 degrees C. [of 60 degrees C or less] [of 70 degrees C or less] [of 80 degrees C or less] Since washing of an effluent cannot fully do temperature of water at less than 10 degrees C, but the elution volume of PVA will be large, and a loss will increase during washing, and PVA(s) will adhere, if the temperature of warm water exceeds 90 degrees C on the other hand, and the workability in the following dissolution process etc. gets worse, it is not desirable.

[0018] As for the weight bath ratio of the water to a PVA chip, or warm water, one or more is desirable, 1.5 or more are more desirable, and two especially or more are the most desirable. The effectiveness that a bath ratio cannot wash enough by there being few amounts of water or warm water less than by one, but reduces the elution volume of PVA is small. Moreover, the upper limit of a bath ratio is less than 100. That is, it becomes [the big improvement to a cleaning effect as 100 or more is not found, but] useless [water or warm water] about a bath ratio, and is uneconomical.

[0019] The washing time amount (time amount after a PVA chip contacts water until the liquid end is completed) of a PVA chip has 30 desirable seconds or more, is more desirable, is still more desirable, and is the most desirable. [of especially 10 minutes or more] [of 5 minutes or more] [of 1 minutes or more]

[0020] How to carry out the liquid end, after there being especially no limit in the washing approach of a PVA chip and carrying out the shower of water or the warm water to a network or the PVA chip on a belt, The approach, water or warm water which puts into a column or a tub, and carries out the liquid end of water or warm water, and the PVA chip in batch standing or after stirring, and a PVA chip are continuously put into a column or a tub, and after washing with a counterflow or concurrent (accompanied by stirring), the approach of carrying out the liquid end etc. is mentioned.

[0021] There is especially no limit also in the liquid cutting method after washing, and separation by the gravity using perforated plates, cloth, nonwoven fabrics, etc. using a centrifugal separator, vacuum suction, a filter press, a roll, a belt, etc., such as squeezing and a network, a decantation, etc. are mentioned.

[0022] Although wash water, such as surface attached groundwater and water-repelling, may remain in the PVA chip after the liquid end in the range which does not spoil the meaning of this invention, as for the water used at the time of washing, it is desirable to carry out separation removal as much as possible from a PVA chip.

[0023] As an approach of using a washed PVA chip and manufacturing a PVA film The PVA solution which dissolved the PVA chip in the solvent is used. The flow casting producing-film method, The wet producing-film method (regurgitation to the inside of a poor solvent), the gel producing-film method (once carrying out cooling gelation of the PVA water solution) the method of carrying out extract removal of the water and obtaining a PVA film and the approach by such combination, and the water that carried out water to the PVA chip -- it can manufacture by the melting extrusion producing-film method for carrying out melting extrusion of the PVA (the organic solvent etc. being included), and performing it etc. It is desirable from a polarization film with the good flow casting producing-film method and melting extrusion producing-film method being obtained also in these.

[0024] As a solvent which dissolves the washed PVA chip used in case a PVA film is manufactured,

dimethyl sulfoxide, dimethylformamide, dimethylacetamide, N-methyl pyrrolidone, ethylene glycol, a glycerol, diglycerol, propylene glycol, a diethylene glycol, triethylene glycol, tetraethylene glycol, trimethylol propane, ethylenediamine, diethylenetriamine, water, etc. can be mentioned, and one sort or two sorts or more can be used among these, for example. Also in these, the partially aromatic solvent of water, dimethyl sulfoxide, or water and dimethyl sulfoxide is used suitably.

[0025] The PVA solution or the PVA concentration of water PVA used in case a PVA film is manufactured has 3 - 70 desirable % of the weight, its 10 - 60 % of the weight is more desirable, its 13 - 55 % of the weight is still more desirable, and its 15 - 50 % of the weight is especially the most desirable. This PVA solution or water PVA may be made to contain a plasticizer, a surfactant, dichromatic dye, etc. if needed.

[0026] In case a PVA film is manufactured, it is desirable as a plasticizer to add polyhydric alcohol. As polyhydric alcohol, ethylene glycol, a glycerol, propylene glycol, a diethylene glycol, diglycerol, triethylene glycol, tetraethylene glycol, trimethylol propane, etc. can be mentioned, and one sort or two sorts or more can be used among these, for example. Diglycerol, ethylene glycol, and a glycerol are suitably used from the improvement effectiveness in ductility also in these.

[0027] As an addition of polyhydric alcohol, 1 - 30 weight section is desirable to the PVA100 weight section, 3 - 25 weight section is more desirable, and 5 - 20 weight section is especially the most desirable. If [than 30 weight sections] more [a dye affinity and ductility may fall if fewer than 1 weight section, and], a PVA film becomes flexible too much and handling nature may fall.

[0028] It is desirable to add a surfactant, in case a PVA film is manufactured. Although there is especially no limitation as a class of surfactant, an anionic or nonionic surfactant is desirable. As an anionic surface active agent, the anionic surface active agent of sulfonic acid types, such as sulfate molds, such as carboxylic-acid molds, such as a lauric-acid potassium, and octyl sulfate, and dodecylbenzene sulfonate, is suitable, for example. As a nonionic surface active agent, for example Alkyl ether molds, such as the polyoxyethylene oleyl ether, Alkylphenyl ether molds, such as polyoxyethylene octyl phenyl ether, Alkylamine molds, such as alkyl ester molds, such as polyoxyethylene laurate, and the polyoxyethylene lauryl amino ether, Polypropylene glycol ether molds, such as alkylamide molds, such as a polyoxyethylene lauric-acid amide, and the polyoxyethylene polyoxypropylene ether, Nonionic surfactants, such as allyl compound phenyl ether molds, such as alkanol amide molds, such as oleic acid diethanolamide, and polyoxyalkylene allyl compound phenyl ether, are suitable. It can be used in one sort or two sorts or more of combination of these surfactants.

[0029] As an addition of a surfactant, 0.01 - 1 weight section is desirable to the PVA100 weight section, the 0.02 - 0.5 weight section is more desirable, and the 0.05 - 0.3 weight section is especially the most desirable. If fewer than the 0.01 weight section, effectiveness of the improvement in ductility or the improvement in a dye affinity may be unable to show up easily, if [than 1 weight section] more, it may be eluted on the front face of a PVA film, and it may become the cause of blocking, and handling nature may fall.

[0030] In case a PVA film is manufactured, in order to reduce a PVA elution volume with the above-mentioned washing, drying enough after film production is desirable.

[0031] It is important for the PVA film of this invention that the elution volume of PVA when leaving the PVA film of 10cm angle in underwater [1l. / 50-degree C] for 4 hours is 1 to 100 ppm. It is 5 to 80 ppm preferably, and especially 10 to 60 ppm are the most desirable. When a PVA elution volume exceeds 100 ppm, the amount of PVA(s) which deposits on the elution volume of PVA and PVA film into a tub, or a polarization film increases, it becomes difficult to obtain few polarization films of the number of defects, or a problem arises at the time of waste water treatment. Moreover, in order to set a PVA elution volume to less than 1 ppm, very a lot of reserve wash water is needed, advanced heat treatment is needed after film production desiccation, uniaxial-stretching nature gets worse, and a good polarization film is hard to be obtained for it to be not only uneconomical, but.

[0032] The measuring method of a PVA elution volume is as follows. The absorbance of the peak which leaves the PVA film of 10cm angle in 1l. distilled water [50-degree C] for 4 hours, carries out coloration of the extract with an iodine-potassium iodide solution, and shows the maximum absorption

with the spectrophotometer UV 1200 by Shimadzu Corp. within 10 minutes is measured. Since the wavelength which shows the peak which shows the maximum absorption with polymerization degree, a saponification degree, etc. of PVA differs (it generally exists in nearly 650-700nm), the calibration curve is beforehand created using PVA or the raw material PVA which removed and refined the additive etc. from the PVA film, and the quantum of the PVA elution volume (PVA concentration in an extract) is carried out from the absorbance obtained from the sample.

[0033] The coloration approach in an iodine-potassium iodide solution is as follows. 90ml of iodine-potassium iodide water solutions which melted 25g iodine to 100ml ion exchange water is mixed with 450ml of boric-acid water solutions which melted the 40g boric acid to 100ml ion exchange water, and 12.7g potassium iodide, and 300ml of ion exchange water is added and diluted, and let what was made into 20 degrees C be a color reagent. To an Erlenmeyer flask with ground-in stopper, a 10ml color reagent is added to the 10ml extract cooled at 20 degrees C, and it mixes, and is left for 15 minutes at 20 degrees C. In addition, when the PVA concentration in an extract is too high, an extract may be diluted with ion exchange water if needed.

[0034] The thickness of a PVA film is 5-150 micrometers preferably, is 20-100 micrometers more preferably, is 30-90 micrometers still more preferably, and is 35-80 micrometers most preferably.

[0035] In order to manufacture a polarization film from the PVA film of this invention, there is especially no limit in the order of actuation of dyeing, uniaxial stretching, and fixed processing that what is necessary is just to heat-treat this PVA film if needed to dyeing, uniaxial stretching, fixed processing, desiccation processing, and a pan. Moreover, uniaxial stretching may be performed two times or more than it.

[0036] Either after uniaxial stretching is possible for dyeing before uniaxial stretching at the time of uniaxial stretching. As a color used for dyeing iodine-potassium iodide; -- direct black 17 and 19,154; direct Brown 44,106,195,210,223; direct red 2, 23, 28, 31, 37, 39, 79, and 81,240,242,247; direct blue 1, 15, 22, 78, 90, 98, 151, 168, 202, 236, 249, and 270; direct violet 9, 12, 51, and 98; direct Green 1, 85; direct yellow 8, 12, 44, 86, 87; direct Orange Dichromatic dye, such as 26 and 39,106,107, etc. can use it with one sort or two sorts or more of mixture. Usually, although it is common to carry out by making a PVA film immersed into the solution containing the above-mentioned color as for dyeing, especially the processing conditions or art, such as mixing a PVA film and producing a film, are not restricted.

[0037] The wet extending method or a dry-heat-stretching method can be used for uniaxial stretching, and it can perform it in air using the PVA film in warm water (it may be among the solution containing said color, and the after-mentioned fixed treatment bath), or after water absorption. Although it is not limited, when extending a PVA film in warm water (wet extension) and 30-90 degrees C carries out dry heat stretching especially of the extension temperature again, 50-180 degrees C is suitable for it. Moreover, the draw magnification (the case of multistage uniaxial stretching total draw magnification) of uniaxial stretching has 4 or more desirable times from the point of polarizability, and especially its 5 or more times are the most desirable. Although especially a limit does not have the upper limit of draw magnification, since uniform extension is easy to be obtained with being 8 or less times, it is desirable. The thickness of the film after extension has desirable 3-75 micrometers, and its 5-50 micrometers are more desirable.

[0038] For the purpose of strengthening adsorption of the above-mentioned color on a PVA film, fixed processing is performed in many cases. A boric acid and/or a boron compound are usually added by the treatment bath used for fixed processing. Moreover, an iodine compound may be added in a treatment bath if needed.

[0039] It is desirable to perform desiccation processing (heat treatment) of said PVA film at 30-150 degrees C, and it is more desirable to carry out at 50-150 degrees C.

[0040] The polarization film obtained as mentioned above is optically transparent, and sticks a protective coat with a mechanical strength on the both sides or one side, and is usually used for it as a polarizing plate. As a protective coat, a cellulose-triacetate (TAC) film, an acetic acid and a butanoic acid cellulose (CAB) film, an acrylic film, a polyester system film, etc. are used. Moreover, as adhesives for lamination, although the adhesives of a PVA system, the adhesives of an urethane system, etc. can be

mentioned, the adhesives of a PVA system are suitable especially.

[0041]

[Example] Although an example is given and this invention is explained concretely hereafter, this invention is not limited at all by these. In addition, the following approaches estimated the dichroism ratio in an example.

[0042] Dichroism ratio: The dichroism ratio was used as an index by which the polarizability of the obtained polarization film is evaluated. Based on Electronic Industries Association of Japan specification (EIAJ) LD-201-1983, it asked for this dichroism ratio from the following formula using the permeability T_s (%) which carried out measurement and count and which was obtained with illuminant C and 2-degree-C visual field, and degree-of-polarization P (%) using the spectrophotometer.

Dichroism ratio = $\log (100 \times P [T_s / 100 - T_s] / 100) / \log (100 \times P [T_s / 100 + T_s] / 100)$

[0043] Warm water with example 1 temperature of 40 degrees C washed the PVA chip for 15 minutes with the weight bath ratio 3. This PVA is saponification degree % and polymerization degree 1750 of 99.9 mols. The water solution of 15 % of the weight of PVA concentration containing this 100 weight section of PVA and the glycerol 10 weight section was prepared. And on the 90-degree C metal roll, flow casting film production was carried out, it dried, this water solution was dried with a 100 more-degree C metal roll, and the PVA film with a thickness of 75 micrometers was obtained.

[0044] The PVA elution volume when leaving the PVA film of 10cm angle started from this PVA film in underwater [1l. / 50-degree C] for 4 hours was 50 ppm.

[0045] Said PVA film was processed in order of preliminary swelling, dyeing, uniaxial stretching, fixed processing, desiccation, and heat treatment, and the polarization film was created. That is, it was immersed in underwater [30-degree C] for 5 minutes, preliminary swelling of this PVA film was carried out, and it was immersed for 3 minutes into the 35-degree C water solution with an iodine concentration [of 0.4g/l.], and a potassium iodide concentration of 40g [/l.]. Then, uniaxial stretching was performed 5.3 times in the 40-degree C water solution of 4% of boric-acid concentration, into the 30-degree C water solution with the potassium iodide concentration of 40g/l., a boric-acid concentration [of 40g/l.], and a zinc chloride concentration of 10g [/l.], it dipped for 5 minutes and fixed processing was performed. Then, the PVA film was taken out, hot air drying was carried out at 40 degrees C under fixed-length, and heat treatment was performed for 5 minutes at 100 more degrees C.

[0046] Thus, the obtained polarization film was 22 micrometers in thickness, and transmittance was [the dichroism ratio of degree of polarization] 33.3 98.5% 43.3%. Even if it furthermore manufactured the polarization film continuously using said PVA film, the fault by the deposit of PVA was not seen.

[0047] Warm water with example 2 temperature of 35 degrees C washed the PVA chip with the weight bath ratio 4 for 2 hours, and the liquid end was carried out. This PVA is saponification degree % and polymerization degree 4000 of 99.9 mols. The water of an amount with which PVA concentration becomes 40% of the weight is added to this 100 weight section of PVA, and the glycerol 10 weight section, and melting kneading was carried out in the extruder, and on the 90-degree C metal roll, melting extrusion was carried out from the dice, it dried, and the PVA film with a thickness of 75 micrometers was obtained.

[0048] The PVA elution volume when leaving the PVA film of 10cm angle started from this PVA film in underwater [1l. / 50-degree C] for 4 hours was 40 ppm.

[0049] Said PVA film was processed in order of preliminary swelling, dyeing, uniaxial stretching, fixed processing, desiccation, and heat treatment, and the polarization film was created. That is, it was immersed in underwater [30-degree C] for 5 minutes, preliminary swelling of the PVA film was carried out, and it was immersed for 3 minutes into the 35-degree C water solution with an iodine concentration [of 0.4g/l.], and a potassium iodide concentration of 40g [/l.]. Then, uniaxial stretching was performed 5.5 times in the 40-degree C water solution of 4% of boric-acid concentration, it was immersed for 5 minutes into the 30-degree C water solution with the potassium iodide concentration of 40g/l., a boric-acid concentration [of 40g/l.], and a zinc chloride concentration of 10g [/l.], and fixed processing was performed. The PVA film was taken out after this, hot air drying was carried out at 40 degrees C under fixed-length, and heat treatment was performed for 5 minutes at 100 more degrees C.

[0050] Thus, the obtained polarization film was 22 micrometers in thickness, and transmittance was [the dichroism ratio of degree of polarization] 41.7 99.6% 43.0%. Even if it furthermore manufactured the polarization film continuously using said PVA film, the fault by the deposit of PVA was not seen.

[0051] In example of comparison 1 example 1, the PVA film was similarly obtained except not washing a PVA chip.

[0052] The PVA elution volume when leaving the PVA film of 10cm angle started from this PVA film in underwater [1l. / 50-degree C] for 4 hours was 200 ppm.

[0053] Said PVA film was processed like the example 1. The thickness of the obtained polarization film was 23 micrometers. Moreover, 43.2%, a dichroism ratio is 32.8 and degree of polarization was satisfactory [transmittance] in respect of the engine performance 98.5%. Moreover, although it has manufactured satisfactory in early stages of production of a polarization film, while manufacturing the polarization film continuously, the fault by the deposit of PVA appeared here and there on the polarization film, and the yield of a polarization film fell gradually.

[0054] In example of comparison 2 example 1, the PVA film was similarly obtained except not adding a glycerol and heat-treating at 190 degrees C instead of drying with a 100-degree C metal roll.

[0055] The PVA elution volume when leaving the PVA film of 10cm angle started from this PVA film in underwater [1l. / 50-degree C] for 4 hours was 0.5 ppm.

[0056] Although it was going to perform the processing same about said PVA film as an example 1, during extension, cutting occurred frequently, it was stabilized, and the polarization film was not obtained.

[0057] Water with example of comparison 3 temperature of 5 degrees C washed for 5 minutes by making a PVA chip into the weight bath ratio 0.8. This PVA is saponification degree % and polymerization degree 4000 of 99.6 mols. The water of an amount with which PVA concentration becomes 50% was added to this 100 weight section of PVA, and the glycerol 10 weight section, and the PVA film was obtained like the example 2 except having carried out melting kneading in the extruder.

[0058] The PVA elution volume when leaving the PVA film of 10cm angle started from this PVA film in underwater [1l. / 50-degree C] for 4 hours was 150 ppm.

[0059] Said PVA film was processed like the example 2. The thickness of the obtained polarization film was 22 micrometers. Moreover, transmittance was [the dichroism ratio of degree of polarization] 40.6 99.7% 42.5%. Moreover, although it has manufactured satisfactory in early stages of production of a polarization film, while manufacturing the polarization film continuously, the fault by the deposit of PVA appeared here and there on the polarization film, and the yield of a polarization film fell gradually.

[0060]

[Effect of the Invention] As mentioned above, since the elution volume of PVA in each process at the time of manufacturing a polarization film is small according to the PVA film of this invention, few polarization films of the number of defects can be obtained with high yield, and, moreover, waste water treatment can also be performed easily. Moreover, since there is little number of defects, the polarization film obtained from this PVA film demonstrates the outstanding polarizability.

[Translation done.]